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Missouri Adolescent Deaths (Age 15-19) by Race and Gender

The Missouri Department of Health and Senior Services Annual Vital Statistics Report presents age-specific death rates for Missouri residents. Table 21 of the annual report illustrates a consistent pattern in death rates by age. After the first year of life, the death rate falls to its lowest point throughout the life span and remains flat through three age groups: 1-4, 5-9, and 10-14. After that, the death rate steadily increases across all ages. The increase consistently begins in the 15-19 age group. Young people in this age group are in a unique stage of life. They are transitioning from childhood to adulthood and experiencing marked physical, emotional, and intellectual changes. Their behavior is frequently characterized as “risk-taking”. They are becoming more independent, yet they still need the support of mature adults. This combination of developmental changes, risk-taking behavior, and greater independence sometimes leads to undesirable consequences including death.

This article examines deaths among Missouri resident adolescents, ages 15-19. It compares deaths in this age group by race, gender and major causes. Since the number of deaths among this age group for a given year is relatively low compared to other age groups, five years of data are aggregated to produce rates that are somewhat stable. The report begins by examining deaths and death rates for 1998 through 2002. These results are compared with the years 1988 through 1992. Death rates are given per 100,000 population. For this report, the denominators will be the population of 15-19 year

olds from census data for the midyears of each period, 1990 and 2000, multiplied by five.

The major racial groups in Missouri are whites and blacks. Aside from examining the major causes of death by race and gender, this report will also look at four subgroups of adolescents: black females, black males, white females and white males.

Statistical Significance

Confidence intervals were developed as a means of assessing the precision of the mortality rates. The fewer number of events the rate is based on the more uncertainty in the rate. In order to test for significant differences between groups and changes over time, 95% Exact Poisson confidence intervals were calculated using the Inverse Gamma function.¹ When the confidence intervals for two rates do not overlap, the observed difference in rates is considered statistically significant.

Causes

As mentioned earlier, the number of deaths among youth ages 15-19 is low in comparison with other age groups. For the five years from 1998 through 2002 there were a total of 1,797 deaths, a rate of 87.0 per 100,000 population aged 15-19. When deaths do occur among this age group, they are most likely to be caused by unintentional injuries (46.9), followed by homicides (12.6),

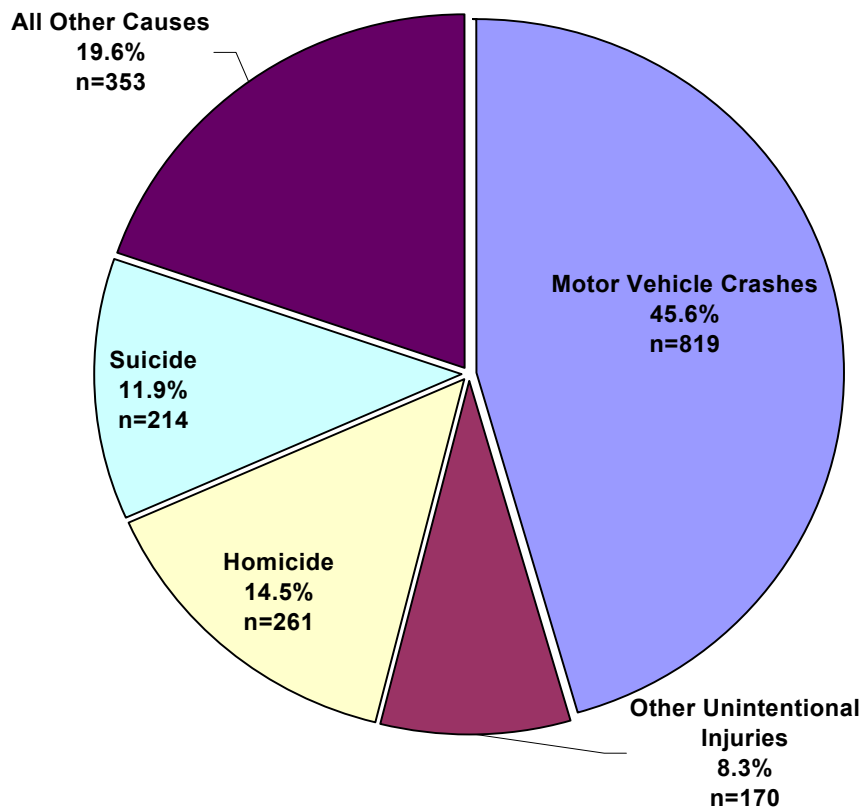
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suicides (10.4), cancer (4.0) and heart disease (2.2), in that order. Deaths due to motor vehicle crashes made up 84.5% of all unintentional injury deaths during 1998-2002. Table 1 and Chart 1 show the number of deaths by each of the leading causes for this age group from 1998-2002. Chart 1 provides the percentage of deaths attributed to each cause, whereas Table 1 gives the rate per 100,000 population by cause.

Also shown in Table 1 are deaths by cause and gender. It is readily seen that male adolescents die at a much higher rate than females (121.3, 51.2). The male death rate due to unintentional injuries is more than twice as high as for females (63.4, 29.7), and almost five times higher for both homicide (20.7, 4.2) and suicide (17.0, 3.5). In each case, the

difference is statistically significant. There was no statistical difference in cancer death rates by gender, although the rate for males was higher (4.3, 3.7). For females the leading causes, in order from greatest to least, were unintentional injuries (29.7), homicides (4.2), cancer (3.7), suicides (3.5), and heart disease (1.3). The rate of unintentional injury deaths was significantly higher than the other rates, whereas the differences were not significant between homicides, suicides and cancer. For males, the leading causes, in descending order, were unintentional injuries (63.4), homicide (20.7), suicide (17.0), cancer (4.3), and heart disease (3.0). The rate of unintentional injury deaths was significantly higher than the other rates. Homicide and suicide rates were not significantly different from each other, but they were both significantly

**Chart 1: Percent of All Deaths Ages 15-19 by Major Causes,
Missouri Resident Data, 1998-2002
N=1797**



Note: Percents may not add up to 100 due to rounding.

Table 1: Leading Causes of Adolescent Deaths (Ages 15-19) by Gender and Race with Rates per 100,000 Population and 95% Confidence Limits: Missouri Resident Data, 1988-1992 versus 1998-2002

	1988-1992				1998-2002			
	Deaths	Rate	Lower CL	Upper CL	Deaths	Rate	Lower CL	Upper CL
All Deaths								
Total Deaths	1,811	99.5	95.0	104.2	1,797	87.0	83.0	91.1
Unintended Inj	937	51.5	48.2	54.9	969	46.9	44.0	49.9
<i>Motor Vehicle</i>	747	41.0	38.1	44.1	819	39.6	37.0	42.4
Homicides	312	17.1	15.3	19.2	261	12.6	11.1	14.3
Suicides	228	12.5	11.0	14.3	214	10.4	9.0	11.8
Cancer	69	3.8	2.9	4.8	82	4.0	3.2	4.9
Heart Disease	43	2.4	1.7	3.2	45	2.2	1.6	2.9
Birth Defects	29	1.6	1.1	2.3	21	1.0	0.6	1.6
Male								
Total Deaths	1,348	145.5	137.8	153.4	1,279	121.3	114.8	128.2
Unintended Inj	674	72.7	67.3	78.4	668	63.4	58.7	68.4
<i>Motor Vehicle</i>	512	55.3	50.6	60.3	545	51.7	47.4	56.2
Homicides	258	27.8	24.5	31.5	218	20.7	18.0	23.6
Suicides	196	21.2	18.3	24.3	179	17.0	14.6	19.7
Cancer	49	5.3	3.9	7.0	45	4.3	3.1	5.7
Heart Disease	31	3.3	2.3	4.7	32	3.0	2.1	4.3
Birth Defects	16	1.7	1.0	2.8	14	1.3	0.7	2.2
Female								
Total Deaths	463	51.8	47.2	56.8	518	51.2	46.9	55.8
Unintended Inj	263	29.4	26.0	33.2	301	29.7	26.5	33.3
<i>Motor Vehicle</i>	235	26.3	23.0	29.9	274	27.1	24.0	30.5
Homicides	54	6.0	4.5	7.9	43	4.2	3.1	5.7
Suicides	32	3.6	2.4	5.1	35	3.5	2.4	4.8
Cancer	20	2.2	1.4	3.5	37	3.7	2.6	5.0
Heart Disease	12	1.3	0.7	2.3	13	1.3	0.7	2.2
Birth Defects	13	1.5	0.8	2.5	7	0.7	0.3	1.4
Black								
Total Deaths	382	154.1	139.0	170.3	387	137.9	124.5	152.3
Unintended Inj	67	27.0	20.9	34.3	85	30.3	24.2	37.4
<i>Motor Vehicle</i>	42	16.9	12.2	22.9	60	21.4	16.3	27.5
Homicides	242	97.6	85.7	110.7	210	74.8	65.0	85.6
Suicides	16	6.5	3.7	10.5	14	5.0	2.7	8.4
Cancer	8	3.2	1.4	6.4	13	4.6	2.5	7.9
Heart Disease	5	2.0	0.7	4.7	12	4.3	2.2	7.5
Birth Defects	6	2.4	0.9	5.3	3	1.1	0.2	3.1
White								
Total Deaths	1,415	91.7	87.0	96.6	1,392	79.8	75.7	84.1

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higher than cancer and heart disease. Cancer and heart disease death rates were not significantly different from each other.

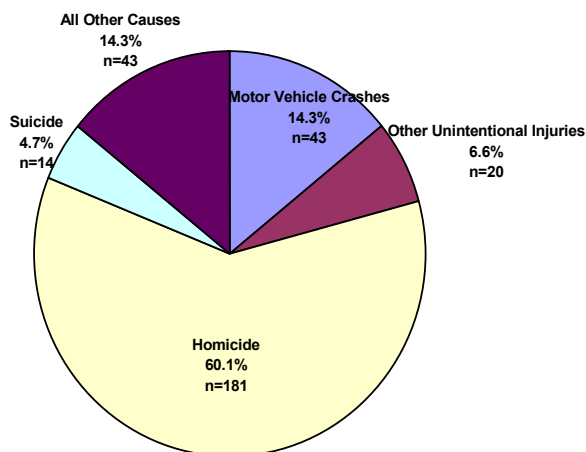
Table 1 also includes deaths and rates by cause and race (white and black). The black adolescent rate of death is much higher than for whites, 137.9 per 100,000 versus 79.8, a difference that is statistically significant. The black homicide rate is higher than the white homicide rate by a factor of 25 (74.8, 2.9). The leading cause of death among black adolescents, homicide, is significantly higher than the leading cause of white adolescent deaths, unintentional injuries. The white unintentional injury death rate is significantly higher than the corresponding black rate. For white adolescents,

the leading causes of death are unintentional injuries (49.9), suicide (11.4), cancer (3.9), homicide (2.9) and heart disease (1.9), in that order.

Cause of Death by Race and Gender

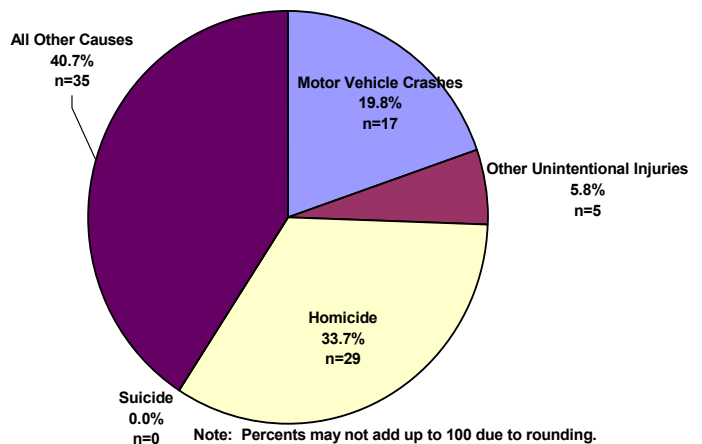
Looking at adolescent deaths by race and gender allows analysis of four different subgroups: black males, black females, white males and white females. Charts 2, 3, 4 and 5 provide the percent of deaths for the major causes for each subgroup. Table 2 includes the total death rate per 100,000 population for each of these groups by each leading cause.

Chart 2: Percent of Black Male Deaths Ages 15-19 by Major Causes, Missouri Resident Data, 1998-2002
N=301



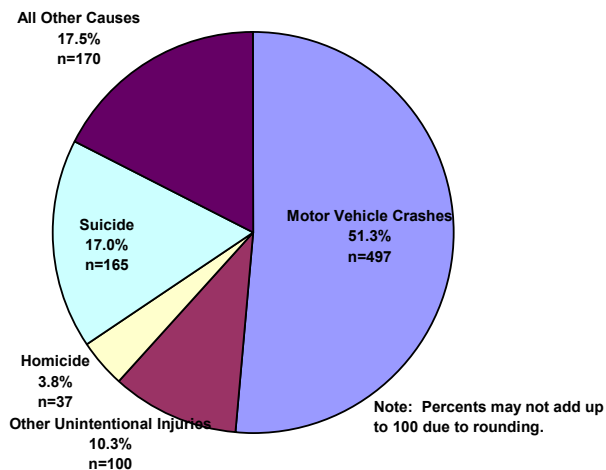
Note: Percents may not add up to 100 due to rounding.

Chart 3: Percent of Black Female Deaths Ages 15-19 by Major Causes, Missouri Resident Data, 1998-2002
N=86



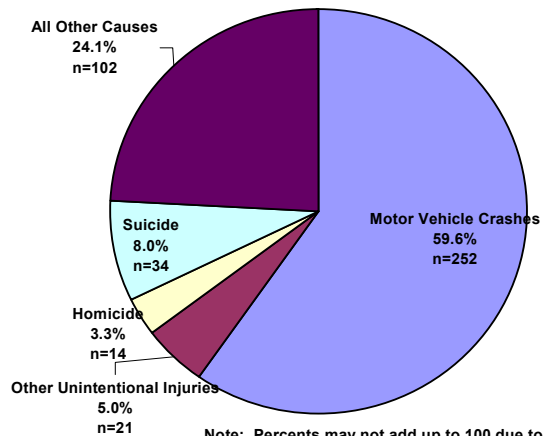
Note: Percents may not add up to 100 due to rounding.

Chart 4: Percent of White Male Deaths Ages 15-19 by Major Causes, Missouri Resident Data, 1998-2002
N=969



Note: Percents may not add up to 100 due to rounding.

Chart 5: Percent of White Female Deaths Ages 15-19 by Major Causes, Missouri Resident Data, 1998-2002
N=423



Note: Percents may not add up to 100 due to rounding.

Although the white female death rate was lower than the black female rate, 49.6 per 100,000 compared to 62.0, the difference was not statistically significant. White males had a significantly higher death rate than both female groups, at 108.8 per 100,000. Black males had the highest rate of all, at 212.0 per 100,000.

More than three-fifths of adolescent black male deaths, 181 of 301 or 60.1%, were due to homicides. Homicides were the leading cause of death among black males and of all 261 adolescent homicides, 69.3% (181) of the victims were black males. The rate of adolescent black male homicides, 127.5 per 100,000, is almost 3 times

Table 2: Leading Causes of Adolescent Deaths (Ages 15-19) by Race and Gender with Rates per 100,000 Population and 95% Confidence Limits: Missouri Resident Data, 1998-1992 Versus 1998-2002

1988-1992					1998-2002				
	Deaths	Rate	Lower CL	Upper CL		Deaths	Rate	Lower CL	Upper CL
Black Males									
Total	328	260.5	233.0	290.2	Total	301	212.0	188.8	237.4
Unintentional Inj	57	45.3	34.3	58.6	Unintentional Inj	63	44.4	34.1	56.8
<i>Motor Vehicle</i>	36	28.6	20.0	39.6	<i>Motor Vehicle</i>	43	30.3	21.9	40.8
Homicide	220	174.7	152.4	199.4	Homicide	181	127.5	109.6	147.5
Suicide	13	10.3	5.5	17.7	Suicide	14	9.9	5.4	16.5
Cancer	4	3.2	0.9	8.1	Cancer	8	5.6	2.4	11.1
Heart Disease	2	1.6	0.2	5.7	Heart Disease	9	6.3	2.9	12.0
Birth Defects	5	4.0	1.3	9.3	Birth Defects	1	0.7	0.0	3.9
Black Females									
Total	54	44.3	33.2	57.7	Total	86	62.0	49.6	76.5
Unintentional Inj	10	8.2	3.9	15.1	Unintentional Inj	22	15.9	9.9	24.0
<i>Motor Vehicle</i>	6	4.9	1.8	10.7	<i>Motor Vehicle</i>	17	12.3	7.1	19.6
Homicide	22	18.0	11.3	27.3	Homicide	29	20.9	14.0	30.0
Suicide	3	2.5	0.5	7.2	Suicide	0	0.0	0.0	2.2
Cancer	4	3.3	0.9	8.4	Cancer	5	3.6	1.2	8.4
Heart Disease	3	2.5	0.5	7.2	Heart Disease	3	2.2	0.4	6.3
Birth Defects	1	0.8	0.0	4.6	Birth Defects	2	1.4	0.2	5.2
White Males									
Total	1,009	128.4	120.6	136.6	Total	969	108.8	102.0	115.8
Unintentional Inj	613	78.0	72.0	84.5	Unintentional Inj	597	67.0	61.7	72.6
<i>Motor Vehicle</i>	472	60.1	54.8	65.8	<i>Motor Vehicle</i>	497	55.8	51.0	60.9
Homicide	35	4.5	3.1	6.2	Homicide	37	4.2	2.9	5.7
Suicide	180	22.9	19.7	26.5	Suicide	165	18.5	15.8	21.6
Cancer	45	5.7	4.2	7.7	Cancer	37	4.2	2.9	5.7
Heart Disease	29	3.7	2.5	5.3	Heart Disease	23	2.6	1.6	3.9
Birth Defects	11	1.4	0.7	2.5	Birth Defects	13	1.5	0.8	2.5
White Females									
Total	406	53.6	48.5	59.1	Total	423	49.6	45.0	54.6
Unintentional Inj	253	33.4	29.4	37.8	Unintentional Inj	273	32.0	28.3	36.0
<i>Motor Vehicle</i>	229	30.2	26.4	34.4	<i>Motor Vehicle</i>	252	29.6	26.0	33.4
Homicide	29	3.8	2.6	5.5	Homicide	14	1.6	0.9	2.8
Suicide	29	3.8	2.6	5.5	Suicide	34	4.0	2.8	5.6
Cancer	16	2.1	1.2	3.4	Cancer	31	3.6	2.5	5.2
Heart Disease	9	1.2	0.5	2.3	Heart Disease	10	1.2	0.6	2.2
Birth Defects	12	1.6	0.8	2.8	Birth Defects	5	0.6	0.2	1.4

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higher than the second leading cause (unintentional injuries, 44.4 per 100,000). The third leading cause is suicide (9.9), followed by heart disease (6.3) and cancer (5.6). There is no significant difference between the rates for suicide, heart disease or cancer.

Among adolescent black females, there is no significant difference between homicides (20.9) and unintended injuries (15.9), the two leading causes of death. Neither is there any significant difference between cancer (3.6), heart disease (2.2), or birth defects (1.4). Homicides and unintentional injuries are significantly higher than the others. There were no suicides for adolescent black females. Therefore, the leading causes of deaths for black female adolescents were homicides, unintentional injuries, cancer, heart disease and birth defects, in that order. For these five years there were 86 deaths among black female adolescents. For cancer, heart disease and birth defects there were fewer than 20 events for the 1998-2002 period.

For white females the leading causes of death were unintentional injuries (32.0), suicide (4.0), cancer (3.6), homicide (1.6) and heart disease (1.2). The unintentional injury death rate was eight times higher than the second leading cause, and significantly higher than all other causes for this subgroup. Over 90% of the unintentional injuries (252 of 273) among white female adolescents were due to motor vehicle crashes. This was the highest percentage of unintentional injury deaths due to motor vehicle crashes among the four subgroups. The difference between suicide and cancer death rates among white female adolescents was not statistically significant.

Among white male adolescents, the two leading causes of death were unintentional injuries (67.0) and suicides (18.5). The unintentional injury death rate was significantly higher than the corresponding suicide death rate. Homicide and cancer death rates were tied as the third leading cause and were significantly lower than the death rate for suicide. The heart disease death rate (1.2) was fifth, but not significantly lower than homicide and cancer death rates.

Changes Over Time

This report also examines changes in adolescent death rates over time. Table 1 includes adolescent death rates for two time periods, 1988-1992 and 1998-2002. The total death rate has fallen significantly, from 99.5 to 87.0 per 100,000. The major causes remain the same, and in the same order. Unintentional injuries, homicides and suicides all decreased although the only death rate to decrease significantly was deaths due to homicide, dropping from 17.1 to 12.6 per 100,000.

Most of the decrease over time is due to decreases in deaths among adolescent males. Among all males, the death rate dropped significantly from 145.5 to 121.3 per 100,000. The male death rate dropped for each cause, although the only statistically significant decrease was for homicides, 27.8 to 20.7 per 100,000. There were no significant changes in the causes of death rates among female adolescents. The total rate dropped slightly from 51.8 to 51.2 per 100,000. For 1988-1992, the leading causes of death among female adolescents in descending order were: unintentional injuries, homicide, suicide, cancer and birth defects. During 1998-2002, the top two female death causes were still unintentional injuries and homicide, followed by cancer, suicide and heart disease, in that order. Among black adolescents, the total death rate fell from 154.1 per 100,000 to 137.9 but this change was not statistically significant. The only significant change was in the black homicide death rate, declining from 97.6 to 74.8 per 100,000. Homicides remained the leading cause of death for black adolescents, with unintentional injuries remaining the second leading cause. One other change of note among blacks is that birth defects were the fifth leading cause of death during 1988-1992. By 1998-2002 the birth defect death rate had fallen and the heart disease death rate had increased, so that heart disease became the fifth leading cause of death.

The death rate among white adolescents decreased significantly, from 91.7 to 79.8 per 100,000. Although the rate for each of the five leading causes also decreased, none of the changes

were significant. Homicides decreased more than cancers, thus these two causes traded places as the third and fourth leading causes of white adolescent deaths.

Changes by Race and Gender

Among the four race-gender subgroups, only two changes over time were statistically significant. The total death rate for white male adolescents decreased from 128.4 to 108.8 per 100,000. Among black males, the homicide death rate fell from 174.7 to 127.5 per 100,000.

Unintentional Injury Deaths Due to Motor Vehicle Crashes

As mentioned earlier in this report, unintentional injuries were the leading cause of death for adolescents age 15-19 for both periods examined. Motor vehicle crashes (MVC) accounted for 79.7% of these deaths during 1988-1992 and 84.5% during 1998-2002. This age group had the second highest MVC death rate during 1988-1992 and the highest MVC death rate for 1998-2002. As shown on Table 2, if MVC were a separate cause of death it would be the leading cause of deaths for this age group, for all the males, all the females, and all the whites. Overall the MVC death rate is 39.6 per 100,000, more than three times higher than second leading cause of death. Among male adolescents, the MVC death rate is almost 2.5 times higher than the second leading cause (51.7, 20.7) and among females the MVC death rate is more than six times the second leading cause (27.1, 4.2). Among white teens, the MVC death rate is almost four times higher than the second leading cause (43.0, 11.4). Of the four race-gender subgroups shown on Table 2, black female adolescents have the lowest MVC death rate, at 12.3 per 100,000. White males have the highest rate at 55.8 per 100,000.

Changes in the rate of MVC deaths over time were not statistically significant, however there are significant differences between the various subgroups of the teen population. Table 1 shows that for male adolescents the MVC death rate is significantly higher than the total rate (51.7, 39.6),

while the female rate of 27.1 is significantly lower. Similarly, among whites, the male MVC death rate is significantly higher (55.8), and the female rate significantly lower (29.6), than the total white rate (43.0). Among blacks, the male MVC death rate is significantly higher (30.3) than the female rate (12.3). The black teen MVC death rate is significantly lower than the white teen rate (21.4, 43.0). As shown on Table 2, there are statistically significant differences in MVC death rates between black males and white males (30.3, 55.8), black females and white females (12.3, 29.6), and between white males and black females (55.8, 12.3).

Conclusions

Over 90% of all adolescent deaths are due to injuries, either unintentional, self-inflicted, or from assault. The Missouri Department of Health and Senior Services published a report in 2002 that provides a snapshot of the extent of injuries in Missouri. The report, *Injuries in Missouri: A Call to Action*, includes injury data for all age groups and all counties in the state.²

Comparing 1998-2002 data with data from 1988-1992 shows that the total death rate and the homicide rate among Missouri adolescents have both decreased significantly. The leading causes of death remain the same: unintentional injury, homicide, suicide, cancer, and heart disease. Deaths due to MVC make up 84.5% of all the unintentional injury deaths. If they were a category unto themselves, MVC deaths would be the leading cause of death among all adolescents, all adolescent males, all adolescent females and all white adolescents. The stability and the magnitude of adolescent MVC deaths over time is reflective of an inexperienced and risk-taking age group gaining legal entrance into a high risk activity. For most of the years covered in this report, Missouri allowed drivers to be fully licensed at age 16. Beginning January 1, 2001, Missouri implemented a Graduated License law that delayed full licensing until age 18. The law is intended to reduce motor vehicle crashes involving young drivers by giving them more supervised driving experience before they begin driving alone, but it is too early to detect

any impact. Among black adolescents, the leading cause of death is homicides. Even though the homicide rate decreased significantly among black adolescents between 1988-1992 and 1998-2002, the rate is still more than twice the rate of the second leading cause (74.8, 30.3).

This report looked at mortality for four major subgroups of Missouri adolescents: black females, black males, white females and white males. Two of these subgroups experienced significant changes that impacted larger demographic subgroups and the total adolescent population. The total death rate for white males and the homicide rate among black males dropped significantly across the two time periods. These changes contributed to statistically significant drops in black homicides, in all white deaths, in male homicides, in all male deaths, all homicides and the overall decline in the death rate.

It is notable that for black females, there were no suicides during 1998-2002. For all females, the suicide rate is almost one-fifth of the male suicide rate (3.5, 17.0) and for blacks the suicide rate is less than half the white rate (5.0, 11.4).

References

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2. Missouri Department of Health and Senior Services, Injuries in Missouri: A Call to Action (December 2002). Available at: www.dhss.state.mo.us/Injuries_in_Missouri/.